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Comparison of Traditional Pull-out Therapy Versus Collaborative Classroom-based Services on Articulation Skills

Pamela S. Davidson
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(TITLE)

BY

Pamela S. Davidson

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Running Head: COMPARISON OF TRADITIONAL PULL-OUT

COMPARISON OF TRADITIONAL PULL-OUT THERAPY VERSUS COLLABORATIVE CLASSROOM-BASED SERVICES ON ARTICULATION SKILLS

By Pamela S. Davidson

Eastern Illinois University

Abstract

The purpose of the present study was to investigate the improvement of articulation skills of children who received speech services through collaborative classroom-based intervention versus those who were provided services through traditional pull-out therapy. Nine children in first and second grades were treated using a collaborative classroom-based model and eleven first and second grade children were provided treatment in a pull-out setting. All twenty students were assessed using the Secord Contextual Articulation Tests (S-CAT) (Secord & Shine, 1997) at the beginning and end of the study. Children treated in the classroom setting weekly received 30 minutes of intervention time from the SLP and their respective classroom teacher as well as an additional 10 minutes (total of 40 minutes of intervention) of individual treatment, which was conducted within the classroom setting. Children participating in the pull-out model received two 20-minute sessions of intervention each week. Results revealed that children who participated in collaborative classroom-based intervention made significantly greater gains in their percent accuracy on IEP goal phonemes produced in words and story telling tasks than children who participated in the traditional pull-out model of intervention. The significantly greater mean gains recognized by the collaborative classroom-based group may have been a result of peer and teacher influence and child practice in a natural setting throughout the school year. The regular classroom environment may be the least restrictive environment for treating some early elementary children with mild to moderate articulation deficits.

ACKNOWLEDGMENTS

Along with the conclusion of this study comes the opportunity to thank all those people who contributed to this project's success. A huge thank you goes to the Carl Sandburg Elementary School administration and staff. I greatly appreciate the support and dedication of the first and second grade teachers as well as the administration throughout the duration of the study. Words cannot express how appreciative I am of Mrs. Pam Paul, the speech-language pathologist who served the children participating in this project. The enthusiasm and wisdom she displayed while working with the children was remarkable and made the current investigation an enjoyable one. I would like to commend Pam Paul for her dedication and efforts because without her this project would not have been possible.

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Finally, I would like to thank my family and friends for being so supportive and understanding while I spent numerous hours working on this project. They always remind me that I can do whatever I put my mind to, and they provided a great deal of encouragement and support throughout the duration of this research study. Thank you once again to everyone.

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CHAPTER I

Introduction

In recent years the attention of many education professionals has been directed towards finding the most effective service delivery model for children with special needs in the school setting. Since the passage of Public Law 94-142 (now IDEA) in 1975 and the introduction of the Regular Education Initiative (REI) by Madeline Will in 1986, special education services have begun to change. IDEA stated that the needs of children with disabilities should be met in the least restrictive environment. REI suggested that partnerships be formed between regular education and special education programs, and that the regular classrooms be adapted to make it possible for learning in that environment.

A large number of children are treated with speech and language disorders in the school setting, requiring speech pathologists to explore various treatment options in order to provide services effectively and efficiently. Traditionally, speech therapy in the school setting has involved drill of discreet isolated skills. The traditional service delivery model removed children from the classroom setting and treated them in a therapy room. However, over time alternative service delivery models have been developed for providing speech-language services in the classroom environment. Collaborative classroom-based services involve the SLP and classroom teacher working together to provide direct services in the classroom. Reported advantages of collaborative services include increased SLP knowledge of curriculum, improved generalization of communication goals to the classroom environment, and service to a larger population of

children who are at risk but do not qualify for speech-language services (Block, 1995; Cirrin & Penner, 1995; Ebert & Prelock, 1994; Miller, 1989; Nelson, 1989).

Elksnin and Capilouto (1994) conducted a survey of speech-language pathologists who had and had not adopted (adopters and nonadopters, respectively) an integrated service delivery model for therapy in the school setting. The surveys revealed that all adopters had used integrated approaches for language and articulation services in the classroom setting. Interestingly, 100% of nonadopters reported a willingness to employ integrated approaches when providing language services, but only 38.5% would use them for articulation services. Elksnin and Capilouto also found that an additional 100% of adopters perceived integrated models to be appropriate for language intervention while only 61.1% considered integrated services to be appropriate for articulation therapy.

Beck and Dennis (1997) also conducted a survey of speech-language pathologists in order to determine perceptions of classroom-based services. This study found that in response to the statement "IEP goals are easily targeted" (in the classroom setting), 34% of SLPs were in agreement, while 29% disagreed. Eighty percent of SLPs considered an advantage of classroom-based intervention to be that clients learn from their peers. In addition, 70% of SLPs felt that there was greater opportunity for appropriate reinforcement in the classroom setting and 90% said that carryover of newly learned skills increased.

Several studies have compared a collaborative treatment model to teacher only instruction for communication and language improvements in whole classes of kindergarten and first-grade students (Ellis, Schlaudecker, & Regimbal, 1995; Farber & Klein, 1999; Hadley, Simmerman, Long, & Luna, 2000). All of these studies found the

collaborative treatment model to be beneficial, however none of the studies examined the effects of the service delivery model on children who had speech-language deficits. Throneburg, Calvert, Sturm, Paramboukas, and Paul (2000) evaluated the effectiveness of a collaborative model, classroom-based intervention without collaboration, and the traditional pull-out model on curricular vocabulary skills in the elementary school setting. They found the collaborative intervention approach to be effective for teaching curricular vocabulary for children who did and did not qualify for speech-language services. In addition, they found that children with speech-language deficits in the collaborative intervention had larger mean gains on measures of vocabulary knowledge than children in the classroom-based and pull-out groups. Barlage, Calvert, Throneburg, and Paul (2001) investigated narrative language curricular skill progress for whole classrooms of children with and without communication disorders. The results indicated that the collaborative group evidenced a greater gain in an evaluation of curricular narrative skills than the traditional group, although this difference was not statistically significant. Children with language impairments who received collaborative classroom-based or traditional nonintegrated pull-out intervention made significantly greater gains in curricular narrative skills than children without communication disorders.

Wilcox, Kouri, and Caswell (1991) compared pull-out and classroom-based language intervention and found that treatment data was not significantly different between the groups, but preschool children who participated in the classroom-based approach had greater generalization to the home environment. Roberts, Prizant, and McWilliams (1995) performed a descriptive study involving interactions between young

language-impaired children and the SLP in pull-out versus classroom-based intervention, but did not investigate the efficacy of either therapy setting.

A study conducted by Benefiel, Throneburg, Calvert and Paul (2001) compared collaborative classroom-based intervention versus traditional pull-out therapy for children with language deficits. Eighteen children with language impairments in first and second grade were included in the study. Ten children received collaborative classroom-based intervention while eight children received traditional pull-out language intervention from the SLP throughout the school year. All children were administered the Boehm Test of Basic Concepts and the ASSET as pre- and post test measures. Results indicated that the pull-out group evidenced larger mean gains than the collaborative group on the expressive portion of the ASSET and three of the four measures from the story retelling task. The mean gain on the Boehm Test of Basic Concepts was larger for the collaborative group than the pull-out group.

Only one nonpublished pilot study (Barlage, Calvert, & Throneburg, 1999) compared traditional pull-out service delivery with collaborative classroom-based intervention for school-age children with speech and language goals on their individualized education plans. This study found the collaborative classroom-based intervention to be similar to pull-out intervention for gains in language goals. The gain for speech goals was slightly lower in the collaborative classroom-based group than the pull-out setting. Although results were interesting, this study was very small in scope with only four first grade subjects in the pull-out group and five first grade subjects in the collaborative classroom-based group. Groups were not well matched initially.

Therefore, Barlage et al. (1999) is the only study that has compared speech progress in pull-out versus classroom-based treatment. This study was very small in scope and had several design weaknesses. Since approximately half of speech pathologists' caseloads are comprised of children with articulation delays in the early elementary school setting (ASHA NOMS, 2000) and many new service delivery models have been developed in the last couple decades, it is imperative to objectively compare the effectiveness of the two primary models on the improvement of speech skills. The purpose of the present study was to investigate the improvement of speech skills of children who received speech services through collaborative classroom-based intervention versus those who were provided services through traditional pull-out therapy.

CHAPTER II

Review of Literature

Articulation Disorders

An estimated 5%-10% of the population has a communication disorder, including speech, language, and/or hearing (Creaghead, Newman, & Secord, 1989; Culton, 1986; National Center for Health Statistics, 1981; Perkins, 1977). Because almost all types of speech disorders, including those of organic etiology (cleft palate, cerebral palsy), involve disorders of articulation, approximately 70% of communication disorders are articulation related, comprising the largest portion of communication disorders (Weiss, Gordon, & Lillywhite, 1987). According to the ASHA 2000 Omnibus Survey, speech-language pathologists employed in the school setting reported treating an average of 52 different clients monthly. Ninety-seven percent of SLPs surveyed regularly treated an average of 23.7 clients who had diagnoses related to articulation/phonological disorders, comprising 46% of the caseload.

As early as 1925, articulation therapy approaches were being explored. The traditional articulation therapy approach which was used in the earliest years of speech therapy, is still used today in modified and updated forms (Creaghead et al., 1989). The traditional therapy approach stressed the importance of positioning the articulators and good auditory skills. This approach has been modified from its original form by many clinicians to accommodate the needs of their clients. Many other treatment approaches have been developed throughout the past several decades.

Articulation Therapy Approaches

Methods of treating articulation disorders have been researched for several decades. According to Creaghead et al. (1989), the treatment approaches commonly employed today are not based on any one of these individual methods, but rather a combination.

The traditional approach to articulation therapy is primarily the work of Charles Van Riper. Van Riper (1939) specified a set of guidelines that are the basis of much of today's traditional therapy. The general guidelines include stages of sensory-perceptual training, sound establishment, stabilization, transfer, carryover, and maintenance. The premise of traditional therapy is that in order to remediate an error sound, the client must first develop an internal auditory model of the target sound. The goal of therapy then shifts to stabilization of the target sound and transferring its use to all situations (Creaghead et al., 1989).

Several studies employing the traditional articulation approach have evaluated the effectiveness of strategies to facilitate generalization of target sound production outside of the therapy setting. Koegel, Koegel, and Ingham (1986) investigated therapy strategies to encourage generalization of children's correctly articulated target sounds outside of the therapy setting. They used a method that required the child to self-monitor his or her correct speech productions in natural environments and record the responses on a data sheet. Completed data sheets were rewarded with stickers, toys, food, etc. and thus reinforced the self-monitoring behavior. In order to verify that the children were actually keeping track of their productions, weekly checks were made with parents/guardians and teachers. In addition, to monitor generalization effects, trained observers who were

unaware of the study initiated conversation with each child and kept a record of productions. Baseline measurements of generalization following the self-monitoring therapy (after children were allowed to terminate use of data sheets) were compared to generalization baselines prior to the intervention methods discussed above. Results indicated that this treatment promoted rapid generalization and maintenance of treatment gains when it was introduced into the regular articulation treatment sequence. A similar study was conducted to determine if outside-of-clinic self-monitoring was more important than self-monitoring performed within the clinic setting on articulation generalization (Koegel, Koegel, Van Voy, & Ingham, 1988). This study was conducted similarly to the one mentioned previously except that the subjects were required to wear wristcounters for recording correct productions as opposed to using tally sheets. Generalization probes were conducted during a self-monitoring in the clinic approach and the results revealed no significant generalization into other environments. However, when the subjects were required to self-monitor outside of the clinic and report their results, consistent improvements in articulation of the target phonemes occurred. Six of the seven subjects maintained 70% correct production levels in follow-up generalization probes. One of the subjects maintained 100% accuracy in generalization probes. The researchers concluded that when a self-monitoring approach was implemented for generalization, an outside- of-clinic method should be used. Research also showed that self-monitoring activities resulted in rapid generalization of articulation improvements in continuous speech (Shriberg & Kwiatkowski, 1987).

A study conducted by Gray and Shelton (1992) evaluated the effects of a self-monitoring treatment method on articulation carryover. The researchers wanted school-

age children to maintain correct articulation of target phonemes in all environments. To facilitate the self-monitoring approach, the students were required to identify his or her productions as either correct or incorrect by indication on a wristcounter. Although the aforementioned studies found positive results, the results of this study by Gray & Shelton did not prove as effective. The two researchers attributed the lack of significant improvement to several factors that were modified in comparison to the previous studies. The aspects modified included choosing older children who had received more articulation treatment than other subjects; reduction in the number of treatment sessions and requiring the children to self-monitor only three times per day (as opposed to continuously throughout the day); a shorter treatment period; and a change in outcome measures. The outcome measures in the Gray and Shelton study included a 10-item measure used in both Koegel et al. studies (i.e., carryover probe administered weekly in the classroom; 1986, 1988) and an additional 30-item measure to assess each subject's carryover in conversation during an interview. Percentages of correct articulation were higher on the 10-item measure than on the 30-item measure. The authors offered several explanations for the differences: the four observers might have used different response criteria in one or both of the measures; observers using the 30-item measurement met with subjects one-to-one in a quiet environment with no distractions, allowing observers to be more 'critical listeners'; and natural reinforcers from teachers and peers in the classroom environment could have influenced correct articulation in the 10-item measure in that the reinforcement was not available in the 30-item interview measure.

Learning theorists such as J. Watson, E.L. Thorndike, C. Hull, and B.F. Skinner contributed to the development of a behavioral approach used in articulation therapy.

This method, based on operant conditioning, is used to change an undesirable behavior to a more acceptable one. The behavioral approach to articulation therapy involves two key aspects: "(1) effective management of consequent events and (2) careful organization of task sequences to be taught" (Creaghead et al., 1989, p. 189). The goal of this therapy is to identify the target sounds for treatment and then determine the antecedent and consequent events to be used in training. Antecedent events include the use of stimuli, cues, and prompts. Consequent events include the ways in which a behavior will be changed, including positive reinforcement to increase the occurrence of a behavior above the baseline, and extinction to decrease the use of an undesirable behavior. Marshall (1970) found that use of a light electric shock to a finger conditioned one 20-year-old male to correctly produce /s/ and /z/ while in therapy sessions. Carry-over to other environments was evident.

Several studies report that a child's stimulability during pretreatment serves as a predictor for success in articulation therapy (Carter & Buck, 1958; Farquhar, 1961; Irwin, West, & Trombetta, 1966; Rvachew, Rafaat, & Martin, 1999). Stimulability is associated with an intact, proper functioning articulatory system. Arguments have been made that "stimulability also reflects an adult-like underlying representation for a given sound" (Powell & Miccio, 1996, p. 39). This may suggest that if a child is stimulable then he or she is capable of producing adult speech, thus greater success in therapy is predicted. Speech sound productions generally improve in individuals who are able to direct their attention to visual and auditory aspects of productions, which includes watching, listening and then imitating other individuals' productions (Lof, 1996; Scott & Milisen, 1954a, 1954b; Smith & Ainsworth, 1967; Wingo & Hoshiko, 1972). The ability to focus

allows individuals to change their productions and motivates them throughout the stimulability process (Lof, 1996).

A new approach to articulation therapy has been examined in recent research articles. Some studies suggest that targeting nonstimulable sounds in therapy may be more effective than focusing on those that are stimulable (Gierut, Morrisette, Hughes, & Rowland, 1996; Miccio & Elbert, 1996; Powell, Elbert, & Dinnsen, 1991). Powell and Miccio (1996) noted in their study, which examined generalization patterns for individuals, that stimulable sounds were most likely acquired by children regardless of whether stimulable or nonstimulable speech sounds were chosen as treatment targets. Powell et al. (1991) found similar results when investigating the relationship between stimulability and phonological generalization in preschool children with misarticulations. The results implied that "nonstimulable sounds are likely to require direct treatment; thus, generalization probe responses may be maximized by treating nonstimulable sounds rather than stimulable sounds" (p. 1318). Gierut et al. (1996) evaluated the difference between treating stimulable versus nonstimulable sounds in two groups of children ranging in age from 3 years 5 months to 5 years 6 months. The first group received therapy for one early and one later-acquired phoneme according to age. A second group included six children in a staggered multiple baseline paradigm. Three subjects were taught early–acquired sounds and three were taught later-acquired sounds. Results showed immediate onset of change following later-acquired phonemes, but delay following early-acquired ones. In addition, treatment of later-acquired phonemes had better generalization to other sound classes than early-acquired phonemes.

Influential Factors in Articulation Therapy

Researchers have been interested in identifying factors that predict successful outcomes in speech therapy. Stimulability, which is discussed above, is one important factor. Another factor, the role of speech perception ability as an indicator of sound production learning, has been debated for years. Rvachew et al. (1999) suggest that a child's achievement on a speech perception test may indicate his or her inclination to attend to and interpret auditory stimuli. Therefore, the ability to concentrate on auditory information may predict whether a child will benefit from treatment. Van Riper (1963) supported the technique of speech perception training, or "ear training," prior to speech activities to facilitate sound production learning. However, supporters of perceptual-motor theories of sound production learning criticize the idea of separating perception and production training. They discuss the importance of speech discrimination training, or self-monitoring, during production practice (Rvachew, 1994).

Kwiatkowski and Shriberg (1993) developed a two-factor framework, which was intended to explain client-related variables that influenced the rate of treatment progress for phonological delay. Client variables included "capability" and "focus". "Capability", which is the most important indicator of success, is described by the child's level of comprehension. Comprehension is indicated by speech discrimination tasks and speech production abilities (phonology) and is indicated by "presence or absence of mechanism, cognitive-linguistic, and psychosocial risk factors" (p. 34). Examples include fluctuating hearing levels due to otitis media as a mechanism problem, poor memory for auditory stimuli as a cognitive-linguistic constraint, and an adverse living environment throughout childhood as a psychosocial constraint. "Focus" refers to the "child's motivation and

effort during treatment sessions" (p. 34). The amount of effort a child exerts in therapy is related to the motivation provided by speech activities and rewards. Kwiatkowski and Shriberg conducted a study that tested the general question of whether the 'focus' could be shown to be a significant predictor of intervention outcome. A review of clinical records for 164 children seen in a university phonology clinic during a 7-year time period was initiated for the investigation. The effects of the children's 'capability' and 'focus' on an outcome measure of speech change progress were monitored for a time period equal to one university semester. The authors noted that the retrospective data reflect limitations in measurement sensitivity and no data was available on individual differences in caregiver input and clinician style, which could have effected progress. However, the study found that some children were linguistically capable and made maximal progress, but required clinicians to make significant modifications in teaching and reinforcing style to reach focus. This suggests that focus constraints might be critical to speech change. Further, a minimal level of capability might be needed for a child to be self-focused without the clinician manipulating teaching and reinforcers for motivation.

Variables controlled by the clinician include service delivery model (e.g., individual treatment, group treatment, block treatment, and use of speech aids and caregivers as service delivery agents) and treatment approach (Rvachew et al., 1999). Individual treatment consists of the SLP treating clients one at a time, which allows goals to be targeted one-on-one and with fewer distractions (Cirrin & Penner, 1995). Group treatment allows the clinician to work with groups of 2-4 children at a time in therapy. Both individual and group treatment can take place in a pull-out (speech room) setting or within the classroom environment. Creaghead et al. (1989) consider individual treatment

to be most beneficial for children who require discrimination training and production practice of the target phoneme at isolation, syllable, or word level. They recommend a group treatment approach for maximizing the use of target sounds in communicative contexts, thus increasing generalization. The treatment approach includes the method of intervention (e.g., traditional articulation therapy versus the cycles approach to phonological delays) and efficiency and efficacy of the treatment (Rvachew et al., 1999). Therapy approaches targeted at treating articulation disorders are numerous, allowing SLPs to make decisions on which are used, based on client needs.

Although several researchers delineate therapy techniques (including service delivery models) that may be most influential in articulation improvement, only one study (Barlage et al., 1999) investigated the impact of service delivery models on elementary school students with speech-language goals. The setting of speech-language services and collaboration with teachers so that they also become delivery agents could be influential factors in articulation therapy. Several service delivery models currently exist, allowing professionals to make decisions about treatment approach and intervention model used according to the needs of the clients involved.

Service Delivery Models

Traditional Pull-Out

The setting for traditional speech-language service delivery is a room separate from the regular or special education classroom, which requires the child to leave the classroom to receive services. A speech-language pathologist has control over the structure of the environment and the communication contexts. The child experiences few distractions and the goals can be targeted one-on-one (Cirrin & Penner, 1995).

Compared with classroom-based services, other benefits of traditional pull-out speech-language therapy include the following: 1) the SLP can implement a variety of teaching approaches without having to modify to fit in a curriculum lesson plan or adapting for other students; 2) if a deficit area is identified, it can be addressed immediately and directly without working into a classroom curriculum; and 3) it is ideal for intervention that requires repetitive practice (Meyer, 1997). The traditional model is based on a medical model in which clients are seen one at a time outside the natural environment (Miller, 1989). A few noted disadvantages of this model include the following: students miss classroom instruction during special services; there may be little opportunity to practice new skills in the classroom; and there is little generalization of speech-language skills to other settings (Block, 1995; Cirrin & Penner, 1995; Ferguson, 1991; Miller, 1989; Nelson, 1989).

Collaborative Classroom-Based Service Delivery

In recent years, clinicians have been encouraged to implement a more integrated service delivery model that requires collaboration between the SLP and regular or special education classroom teachers. The movement began with the passing of PL 94-142 (the Education for All Handicapped Children Act-now IDEA) in 1975, which mandates that all children receive a free and appropriate public education in the least restrictive environment. Furthermore, in 1986 Madeline Will, former Assistant U.S. Secretary of Education, introduced the Regular Education Initiative (REI) in an attempt to educate children from special programs more effectively. This movement was sparked when review of graduation rates and employment rates for individuals from special programs indicated declining numbers. She suggested that partnerships be formed between regular

education and special education programs and that the regular classroom be adapted to make it possible for learning in that environment.

Increased interest in and support for alternate provider roles resulted from REI. Definitions of the provider role in service delivery expanded as a result. The various provider roles that can occur in a collaborative treatment model are described in Table 1.

Table 1. Collaborative Model Approaches

Approach	Explanation
One teach, one observe	One professional observes, while the other assumes primary instructional responsibility
One teach, one "drift"	One professional assumes primary instructional responsibility and the other assists students with their work, monitors behavior, etc.
Station teaching	The SLP and teacher divide instructional content into two parts. Groups are switched so that all students receive instruction from each teacher.
Parallel teaching	Each professional instructs half the group, each addressing the same instructional objectives.
Remedial teaching	One professional instructs students who have mastered the material to be learned while the other reteaches those who have not mastered the material.
Supplemental teaching	The SLP or teacher presents the lesson using a standard format. The other adopts the lesson for those students who cannot master the material.
Team teaching	Both professionals present the lesson to all students, which may include shared lecturing or having one teacher begin the lesson while the other takes over when appropriate.

Note. Adapted from "Speech-language pathologists' perceptions of integrated service delivery in School settings," by Elksnin and Capilouto, 1994, Language, Speech, and

Hearing Services in Schools, 25, p. 260.

Collaborative classroom-based interventions are defined as the "SLP providing some regularly scheduled direct intervention services to students within the classroom" (Cirrin & Penner, 1995, p. 332). In this context, the SLP and classroom teacher work together providing direct services in the classroom. Collaboration is defined by Friend and Cook (1992) as "a style for direct interaction between at least two coequal parties voluntarily engaged in shared decision making as they work toward a common goal." Marvin's (1990) definition of collaboration is "a voluntary interaction between colleagues having a parity of knowledge and skills."

The key aspect of collaboration is the cooperation of two or more professionals who work together towards a common goal. The teacher shares knowledge about the curriculum with the speech-language pathologist and the SLP provides the teacher with techniques to facilitate communication (Prelock, Miller, & Reed, 1995). In order for a collaborative model to work, the SLP and teachers must have regularly scheduled planning time throughout the period of service delivery (ASHA, 1993).

A collaborative service model is reported to have many benefits. Advantages of this service delivery model include allowing children to practice their target behavior in a naturalistic environment with peers, and increasing the opportunity for classroom teachers to develop strategies for children with speech and language difficulties (Wilcox et al., 1991). Collaborative intervention also is theorized to increase speech-language pathologists' understanding of curriculum, improve generalization to classroom curriculum, and serve a larger population of children who are at risk but do not qualify for speech or language services (Block, 1995; Cirrin & Penner, 1995; Ebert & Prelock,

1994; Miller, 1989; Nelson, 1989). Allowing children to remain in the classroom during treatment exercises gives them a more natural environment in which to interact and practice and more partners with whom to communicate (Farber & Klein, 1999).

Survey Results

Researchers have recently conducted surveys to obtain information about speech-language pathologists' applications of integrated service delivery models. These surveys examined the type of model used, the frequency of its use, and perceptions of the SLPs and classroom teachers who were involved in the model's employment.

Elksnin and Capilouto (1994) surveyed speech-language pathologists who had adopted (58%) and had not adopted (42%) an integrated service delivery model for therapy in the classroom. The majority of SLPs who used integrated service delivery models reported doing so in a relatively independent manner from the classroom teacher. The models most commonly employed were one teach/one drift (83.3%) and one teach/one observe (72.2%). Speech-language pathologists perceived the most effective approach to be team teaching. The surveys also revealed that all adopters had used integrated approaches for language and articulation services in the classroom setting. Additionally, 100% of adopters (who employed integrated services) perceived integrated models to be appropriate for language intervention while only 61.1% considered integrated services to be appropriate for articulation therapy. Interestingly, 100% of nonadopters reported a willingness to employ integrated approaches to provide language services, but only 38.5% would use them for articulation services. The survey by Elksnin and Capilouto indicated that those elements classified as most important for an effective integrated model were knowledge and skills of the SLP and classroom teacher, time to

plan, and administrative support. The speech-language pathologists perceived the advantages of this model to include carryover of speech and language skills and increased knowledge of the relationship between language and academics. The perceived disadvantages included extra planning time required, difficulty incorporating IEP goals, and less individualization.

Beck and Dennis (1997) also completed a survey of speech-language pathologists in order to determine their perceptions of classroom-based services. This study found that in response to the statement "IEP goals are easily targeted", 34% of SLPs were in agreement while 29% disagreed. Eighty percent of SLPs considered an advantage of classroom-based intervention to be that clients learn from their peers. In addition, 70% of SLPs felt that there was greater opportunity for appropriate reinforcement in the classroom setting and 90% said that carryover of newly learned skills increased. The SLPs and teachers similarly rated the advantages of integrated services to be the enhancement of turn-taking skills displayed in the classroom and improvement of attention and listening skills. The two groups similarly noted problems in coordinating planning time for intervention.

Paramboukas, Calvert, and Throneburg (1998) conducted a survey of 24 SLPs employed in school settings throughout east central Illinois. Seventy one percent of SLPs surveyed reported use of classroom services. However, the classroom based services were only implemented for an average of 2.5 hours per week while the remainder of services were provided in the traditional pull-out setting.

Research on Different Service Delivery Models

Theoretical literature has explained the many possible benefits of collaborative classroom based services and many speech-language pathologists report using some type of integrated model for some of their students. However, the effectiveness of collaboration has not been thoroughly researched. A few studies have compared a collaborative treatment model to teacher only instruction for communication and language improvements in kindergarten and first-grade students.

Collaboration versus Teacher-only Instruction

Efficacy studies by Barlage et al. (2001), Calvert, Throneburg, Grimaldi, Paul & Althoff (2001), Ellis et al. (1995), Farber and Klein (1999), Hadley et al. (2000), and Throneburg et al. (2000) examined the influence of collaborative classroom-based intervention for early elementary school children on improvement of their communication and language skills.

A study by Ellis et al. (1995) found the collaborative consultative approach to teaching basic concepts was more effective for one kindergarten class than traditional teacher only instruction provided in a second kindergarten classroom. In the Ellis et al. study, a collaborative team consisted of a school speech-language pathologist, university faculty, a classroom teacher, and a physical education teacher. These professionals worked together to provide 60 minutes of concept instruction per week to 20 kindergarten children. Throughout the intervention period, the speech-language pathologist met with the teachers weekly for fifteen minutes. The results of this study found that the experimental group scored significantly higher on post-test scores of basic concepts than the control group who received the regular kindergarten curriculum.

The Farber and Klein (1999) study used a program for Maximizing Academic Growth by Improving Communication (MAGIC). The participants of this study included 552 children from 12 classrooms in six different elementary schools. The children were divided into two treatment groups and a control group. The treatment groups received 2.25 hours per week of instruction by the speech-language pathologist and classroom teacher for the entire school year. The control group was in a regular education classroom and was not part of the MAGIC program. During the teacher-therapist co-teaching sessions, a split-class or a whole-class format was used and one-hour weekly planning meetings were implemented throughout the school year. At the completion of the school year, each child was administered the MAGIC Test. This test assessed speaking, listening, reading, and writing in four separate subtests. A post-test design was used to compare the groups of children. Overall, both treatment groups received higher scores on all subtests than the control group. Although this study did not look directly at speech-language skills or at speech-language delayed children, the collaborative approach was found to be beneficial for whole classrooms of children for teaching vocabulary and cognitive-linguistic concepts in addition to increasing development of writing skills needed for production of relevant sentences with correct mechanics and spelling.

The study by Hadley et al. (2000) focused on language development for inner-city children with limited communication skills. Participants included 86 kindergarten children. The children were divided into two experimental classrooms and two control classrooms. The speech-language pathologist taught with the teachers for 2 ½ days per week in each experimental classroom. Weekly planning sessions were also implemented. The results of the study were determined by pre- and post-test measures of vocabulary

abilities and phonological awareness skills. The collaborative group performed significantly higher on post-tests of vocabulary and phonological awareness than the control group.

Calvert et al. (2001) conducted a study that compared the effects of collaborative classroom-based intervention versus traditional services on measures of listening and reading comprehension skills for children with and without speech-language deficits. Twelve classes of first through third grade students (four classes of each grade level) participated in the study, for a total of 139 subjects. Students participated in only one of the two intervention settings. One set of grade levels participated in the collaborative group and the other participated in the traditional intervention at two schools. The six classes that were included in the collaborative group received classroom instruction from the teacher and a speech-language pathologist. Instruction, which occurred during the language arts curriculum, included vocabulary as well as curricular comprehension skills. The teacher and SLP employed a team teaching, one teach/one drift, or station teaching delivery models. Children in this group also received a minimum of 15 minutes of pull-out therapy a week in order to fulfill the minutes recommended on the individualized education plan (IEP). Each teacher and speech-language pathologist met for weekly 30-minute conferences throughout the semester in order to discuss the previous and upcoming lesson plans. Children in each of the six classes receiving traditional intervention were taught by the teacher only. The SLP did not provide services in the classroom. Children with speech-language deficits in this treatment condition received pull-out therapy each week to satisfy the number of minutes recommended by the IEP (Calvert et al., 2001). The subjects' listening and reading comprehension skills were

assessed with the Weschler Individualized Achievement Test in the beginning of February and the end of April. Results indicated that the children with speech-language deficits who participated in the collaborative lessons made more than double the gain in listening comprehension as children with speech-language deficits who participated in the traditional classes. Children with speech-language deficits who participated in the collaborative classes demonstrated larger gains for listening and reading comprehension than did children with speech-language deficits in the traditional classrooms. Children without speech-language deficits in the collaborative classrooms also made greater gains in listening comprehension than did children in the traditional classrooms. Reading comprehension gains were similar for children without speech-language deficits participating in both conditions (Calvert et al., 2001).

Throneburg et al. (2000) evaluated the effectiveness of three service delivery models (collaborative model, classroom-based intervention without collaboration, and the traditional pull-out model) on curricular vocabulary skills in the elementary school setting. Subjects were 177 children from 12 kindergarten through third grade classrooms. In order to qualify for language intervention, a child was required to score 1 standard deviation or greater below the mean on a standardized language test. A score of 1 standard deviation or greater below the mean on a standardized articulation test was needed for a child to qualify for speech services. All conditions received the same curricular vocabulary targets and used the same curricular materials. In the collaborative setting, language activities were planned and co-taught by the SLP and classroom teacher. The language lessons took place once per week for 40 minutes over a 12-week period. Children who received speech-language services also minimally received one

small group or individual 15-minute pull-out session per week, for a total of 55 minutes of therapy per week. Children in the classroom-based (teacher-SLP independent) group were exposed to language lessons from the SLP in the classroom for 40 minutes once per week for 12 weeks. Children who also received speech and language services minimally received one small group 15-minute pull-out session per week in the speech room. The traditional setting (SLP pull-out, teacher classroom) treated the children who qualified for speech or language services to be in the speech room for individual or small group pull-out sessions for an average of 50 minutes weekly. Specially designed tests that assessed curricular vocabulary words for each of the four grade levels were administered as pre- and post-tests. Results of the Throneburg et al. (2000) study indicated that children in the collaborative and classroom-based interventions who did and did not qualify for speech or language services demonstrated significantly larger mean vocabulary gains than those children in the traditional teacher only setting. Children with speech-language deficits in the collaborative condition made significantly greater gains than subjects in the classroom-based or traditional pull-out settings.

Barlage et al. (2001) conducted research investigating narrative language curricular skill progress for whole classrooms of children with and without communication disorders. A single speech-language pathologist divided her caseload in half and provided collaborative classroom-based services to children from five classrooms while providing traditional nonintegrated pull-out service delivery to children from four classrooms over the course of a school year. The teachers in the five collaborative classrooms and the SLP incorporated children's literature into collaborative lessons and focused on eight language arts curricular goals as well as the needs of the

speech-language impaired children. Results indicated that the collaborative group evidenced a greater gain in an evaluation of curricular narrative skills than the traditional group, although this difference was not statistically significant. Children with language impairments who received collaborative classroom-based or traditional nonintegrated pull-out intervention made significantly greater gains in curricular narrative skills than children without communication disorders.

Collaborative Classroom-Based Versus Pull-out Intervention

Most of the studies that have compared collaborative classroom-based with pull-out intervention have only included preschool children with language deficits. The interactions between clients and speech-language pathologists during traditional pull-out and collaborative language intervention were examined in a study by Roberts et al. (1995). The study consisted of fifteen children with disabilities between the ages of one and five years of age that attended a mainstreamed university daycare program. The children had mild or moderate cognitive and developmental delays and had a range of developmental disabilities with different etiologies. Two speech-language pathologists worked with the children. Each child was assigned to one of six classrooms based on his or her chronological age. All children in each class were within the same age range. The ABILITIES Index (Simmeonson & Bailey, 1980) and Battelle Developmental Inventory (Newborg, Stock, Wneck, Guidubaldi, & Svinicke, 1984) were administered prior to the school year to find the developmental profile and overall developmental age respectively for each child with a disability. All children with disabilities within each class were then matched into pairs according to the data. One member of each pair was randomly assigned to either pull-out or collaborative therapy. After 3 months of receiving

treatment in their assigned setting, all children and the SLP were videotaped in their treatment sessions. Ten minutes from each of two consecutive treatment sessions were transcribed, for a total of 20 minutes, following the guidelines of the Systematic Analysis of Language Transcripts (SALT; Miller & Chapman, 1985). Videotapes were reviewed in order to document each turn taken by the child and speech-language pathologist. Specific parameters were set up and followed when analyzing the categories of turn taking. Three individuals, who were unaware of the purpose of the study, coded the interactions.

Results indicated that speech-language pathologists took significantly more turns during the out-of-class sessions than during the in-class sessions. However, there was not a difference in the percentage of responses, information sharing, behavior requests, or acknowledgments. Children complied more with requests during out-of-class treatment than during in-class, and did not respond to requests more often during in-class compared to out-of-class sessions. They did not significantly differ in the number of turns, percentage of responses, and/or percentage of behavior regulation.

A study by Wilcox et al. (1991) compared the effectiveness of classroom intervention versus individual pull-out treatment in promoting initial lexical acquisition for young preschool children with language delays. This study provided classroom or individual intervention to developmentally delayed 20-47 month old children. An early childhood special educator and a speech-language pathologist collaborated for the classroom intervention. A student clinician and a supervisor provided the individual intervention. The two intervention conditions provided the same number of models per session. Results of this study did not find a difference in the treatment data for the two

intervention conditions. However, children in the classroom-based intervention program demonstrated greater productive use of target words in the home setting. This study revealed that the benefits of the collaborative approach extended to home generalization of language learning.

Valdez and Montgomery (1997) conducted a study with 40 African American Head Start children who had communication disorders comparing the effects of a pull-out intervention model with an inclusionary model on treatment outcomes. Subjects were randomly assigned to the pull-out setting or the consultation collaboration classroom model (20 children in each group). All children were administered the Clinical Evaluation of Language Fundamentals (CELF-Preschool; Wiig, Secord, & Semel, 1991) to assess language abilities/deficits. All subjects received treatment for 90 minutes one day each week for six months (36 hours of treatment over a six month period). There were two inclusion classrooms and two pull-out groups, each classroom having children from four different Head Start Centers. The two SLPs who conducted the treatment each had one pull-out group and one inclusion group for which they provided concept development. The subjects were post-tested with the CELF-Preschool following 6 months of treatment. Comparison between the pre- and post-tests for each child indicated no clinically significant differences between the inclusion and pull-out groups in total language scores, receptive language scores and expressive language scores.

Benefiel, Calvert, Throneburg, and Paul (2001) compared the effectiveness of collaborative classroom-based intervention with the traditional pull-out service delivery model for students with language deficits. Eighteen children with language impairments in first and second grade participated in the study. Ten children received collaborative

classroom-based intervention while eight children received traditional pull-out language intervention from one SLP during the school year. Review of children's language IEP goals indicated all had deficits in concepts and/or other discrete semantic skills such as labels, associations, categorization, attributes, similarities, and differences. The Boehm Test of Basic Concepts and the ASSET were administered as pre-and post-test measures. Language skills were also assessed at the beginning and end of the school year using the narrative retelling tasks from the Strong Narrative Assessment Procedure. Inferential statistics were not used to analyze the data due to the small number of subjects per group included in the assessment results. The mean gains evidenced by the pull-out group were larger than the mean gains evidenced by the collaborative group on the expressive portion of the ASSET and three of the four language measures from the story retelling task. The mean gain on the Boehm Test of Basic Concepts was larger for the collaborative group than the pull-out group.

A study by Benefiel, Throneburg, et al. (2001) described child production practice and the number and type of SLP treatment behaviors used for first and second grade children with speech-language deficits during pull-out and classroom-based intervention. Seventy-two hours of collaborative classroom-based or pull-out treatment sessions were observed for 18 first and second grade children with articulation and language IEP goals throughout the school year. Results of the investigation indicated that the amount of practice on IEP objectives received by children with language disorders was similar during both the collaborative and pull-out groups. On the contrary, children with articulation IEP objectives participating in the collaborative classroom-based setting had less than half as many IEP objective productions than children who were treated in the

traditional pull-out service delivery model. Similar trends were evident in SLP treatment behaviors. Amounts of treatment behaviors used by the SLP were similar in both experimental settings for children with language IEP goals. However, the SLP used significantly fewer treatment behaviors for children with articulation goals in the collaborative classroom-based setting than children in the pull-out model. Children's learning or IEP progress was not reported for children in the two service delivery models.

Only one study compared traditional pull-out service delivery with collaborative classroom-based intervention for speech-language progress for school-age children with speech-language deficits. This study by Barlage et al. (1999) examined nine first grade children from two elementary schools who had speech-language goals. Results of this study showed that collaborative classroom-based intervention was similar to pull-out intervention on mean percentage gain on language IEP goals ($\underline{M}$= 15.86 and 14.60 respectively). For speech IEP goals, the mean percentage gain was slightly lower in the collaborative classroom-based setting ($\underline{M}$= 12.00) as compared to the pull-out setting ($\underline{M}$= 16.00). These results were not evaluated statistically due to the small number of children participating in each group (4 or 5 children per group).

Summary and Statement of Objectives

Service delivery models for speech-language intervention have evolved over the past several decades as a result of new laws and changing theories. Typically, the traditional pull-out approach has been the intervention model of choice for children with speech and/or language deficits in the school setting. However, in recent years, more emphasis has been put on classroom-based service delivery models for treatment of children. Approximately 70% of speech-language pathologists working in school

settings employ some classroom-based services as indicated by recent surveys, but the majority of services continue to be provided in the pull-out setting (Beck & Dennis, 1997; Elksnin & Capilouto, 1994; Paramboukas et al., 1998).

Research comparing the effects of collaborative classroom-based speech-language intervention with the traditional pull-out model for school-age children is inadequate. The majority of studies with school-age children (Ellis et al., 1995; Farber & Klein, 1999; Hadley et al., 2000) have made comparisons between whole classes of children who received teacher-only instruction and whole classes that received collaborative instruction. Two studies (Calvert et al., 2001; Throneburg et al., 2000) evaluated the effectiveness of a collaborative model and the traditional models on curricular vocabulary skills or reading/listening comprehension for children with and without communication disorders in the elementary school setting. However, only one limited unpublished pilot study by Barlage et al. (1999) compared traditional pull-out service delivery with collaborative classroom-based intervention for nine first grade children with speech-language individualized education plans (IEPs). This study found collaborative intervention to be similar to pull-out intervention on mean gain for language IEP goals. The collaborative group scored slightly lower than the pull-out group on mean gain for speech IEP goals. A study by Benefiel, Throneburg, et al. (2001) described child practice and SLP treatment behaviors for first and second grade children during pull-out and collaborative classroom-based intervention. The study indicated that children with articulation deficits in the classroom-based model had half as many IEP objective productions as children in the pull-out setting. The study did not report children's learning/IEP progress in the two models.

The purpose of the present investigation was to compare the effectiveness of speech intervention in the classroom with pull-out intervention in the speech therapy room with a larger number of first and second grade students who have speech sound deficits. The research question is the following:

1. Is there a significant difference between classroom-based therapy and traditional pull-out intervention for increasing children's articulation abilities in the areas of:
    a. speech sounds in words
    b. speech sounds in story retelling

CHAPTER III

Methods

Overview

The purpose of the present study was to compare the effects of collaborative classroom-based intervention with the traditional pull-out service delivery model on articulation skills for students with speech IEPs. Participants included twenty students from seven first and second grade classrooms. The Goldman-Fristoe Test of Articulation (Goldman & Fristoe, 1986) and the Secord Contextual Articulation Tests (S-CAT; Secord & Shine, 1997) were used during pre- and posttesting to evaluate the effectiveness of the intervention.

Subjects

Subjects were twenty children with signed permission slips (Appendix A) enrolled at Carl Sandburg Elementary School located in east central Illinois. Two first grade students and seven second grade students participated in the collaborative group and seven first grade students and four second grade students were in the pull-out group. Subjects with speech deficits were all diagnosed with articulation delays, but did not have other organic/neurological delays. All subjects scored one standard deviation or greater below the mean on one standardized test of articulation and qualified for speech services from the SLP. Six children qualified for both speech and language services. Of the children qualifying for both speech and language services, one first grade student and two second grade students were in the collaborative group and two first graders and one second grader were in the pull-out group. Nine children received services using a collaborative classroom-based model and ranged in age from 6 years 1 month to 8 years 5

months (M = 7:5). The eleven children who received intervention in the pull-out service delivery model ranged in age from 6 years 2 months to 8 years 5 months (M=7:3). The two groups were similar in the amount of previous therapy received with the collaborative group having a range of 1-5 (M=2.89) years of previous speech services and the pull-out group receiving a range of 1-4 (M=2.00) years of speech therapy prior to the present study. All children in both the collaborative and pull-out groups received 40 minutes of intervention (see Table 2 for group subject characteristics).

The mean percent rankings on the Goldman-Fristoe Test of Articulation (1986) pretests were similar between groups with the collaborative group's scores ranging from 0%-51% (M = 16.67) and the pull-out group's scores ranging from 3%-63% (M = 23.64) at the beginning of the school year. The collaborative group's mean number of errors on the Goldman-Fristoe Test of Articulation Sounds-in-Words Subtest pretest was 13.78 (range of 4-31 errors) which was slightly higher than the pull-out group's mean number of 10.36 (range of 2-24 errors). However, the p value of .345 demonstrates that this was not significantly different. The mean number of sounds on IEP goals for each group was also similar. The 9 children in the collaborative group had a range of 1-7 goal sounds (M= 3.33) for a group total of 29 goal sounds. The number of goal sounds stated on the IEPs of the 11 children in the pull-out group ranged from 1-6 (M=2.64) for a group total of 29 goal sounds. The SLP providing intervention services provided information about goal sounds that she considered non-stimulable at the beginning of the school year. Five children in the collaborative group were stimulable for all of their goal sounds and four children were not considered stimulable for one of their goal sounds (group total of 4 non-stimulable sounds) at the beginning of the school year. The pull-out group had seven

children that were stimulable for all of their goal sounds, four children had one sound each that the SLP considered non-stimulable, and one child had two sounds that were considered not stimulable (group total of 6 non-stimulable sounds) at the beginning of the school year (see Appendix B for individual subject characteristics).

Table 2. Subject Characteristics

Group	Age	Past Therapy in Years	IEP Goal Sounds	Goldman Fristoe Percent Rank	# of errors on Goldman Fristoe
Collaborative					
M	7:5	2.89	3.33	16.67	13.78
(SD)	(0:9)	(1.17)	(2.06)	(15.25)	(9.05)
Pull-Out					
M	7:3	2.00	2.64	23.64	10.36
(SD)	(0:8)	(0.89)	(1.86)	(18.06)	(6.70)
p-value	(p=.545)	(p=.069)	(p=.347)	(p=.370)	(p=.345)

Assessment

The assessment procedures were similar for both pre- and posttest situations. Testing was performed in a quiet room within the elementary school that was free of visual and auditory distractions. Children were assessed individually. A graduate student in communication disorders and sciences administered the tests and recorded the children's responses. A certified speech-language pathologist attended all assessment periods and also recorded responses. The certified SLPs judgment in scoring was used for this study while the graduate student's judgment scores served to ensure reliability. The speech-language pathologist who evaluated the children was unaware of the intervention condition in which each child participated (i.e., experimental or control). Articulation abilities were pretested during the last two weeks of September 2000 and

posttested during the first two weeks of April 2001 for all subjects in first and second grade with speech goals on their IEPs. The Sounds-in-Words Subtest portion of the Goldman-Fristoe Test of Articulation (1986) was used to evaluate each child's general articulation abilities on all sounds. The Sounds-in-Words Subtest contains 35 pictures of objects and activities. The subject is required to name the pictures and reply to questions about some of the pictures (a total of 44 responses). All individual consonant sounds in the English language are tested except for /zh/ (as in measure) due to its infrequent occurrence. Each consonantal phoneme is evaluated in the initial, medial, and final position with the exceptions of medial /h/, /w/, /hw/, and /j/, and the final voiced /th/ since they are relatively rare in these positions. The child's response was recorded on the score sheet as a slash (/) for incorrectly produced responses and the box was left empty or scored with a plus (+) if the sound was articulated correctly. All testing was audiotaped. Inter-judge reliability between the graduate student and SLP was calculated on 20% of the testing items for the Goldman-Fristoe Test of Articulation. A Pearson Correlation determined inter-judge reliability was 0.881.

All phonemes listed as goals on the children's IEPs were evaluated with the Secord Contextual Articulation Tests (S-CAT; Secord & Shine, 1997). Two components of S-CAT were used as pre- and post-assessment tools in the current study, the Contextual Probes of Articulation Competence (CPAC) and the Storytelling Probes of Articulation Competence (SPAC; Secord & Shine, 1997). The CPAC was used to obtain a detailed assessment of specific error phonemes in words. CPAC contains a list of pre- and posttest probe words and sentences for each individual speech sound in which the child imitates the SLP's model. The CPAC contains lists of 41 to 85 single words and

two-word phrases in addition to 5 sentences (with 10 words containing the target sound) for each phoneme. The examiner instructed each child to listen carefully and repeat what was heard as the tester read the stimulus words/sentences slowly and recorded the child's response. Following the list of words presented by the tester and imitated by the child, a list of five stimulus probe sentences targeting the same phonemes were presented for imitation. The procedure was similar to the word probes, but evaluated continuous speech rather than isolated words. A percent accuracy was calculated for each IEP goal sound by determining the number of correct productions divided by the total number of items containing the target phoneme.

Storytelling Probes of Articulation Competence (SPAC) were administered following the CPAC. The SPAC probes were used to evaluate connected speech for all consonant sounds that were IEP goals for each child. In order to assess the child's performance in connected speech, a story from the SPAC that corresponded to each of his or her target sounds was administered for imitation. Each story contained a minimum of 10 and often more than 20 words with the target phoneme in a variety of word contexts and syllable functions. For example, the story that evaluated the /s/ phoneme is about Sam and Lucy who miss their bus and might be late for school. Each story probe contained four pictures related to the phoneme to be assessed. The child viewed the pictures as the examiner read the story. After the story was read, the examiner asked the child to retell the story using the picture cues. When necessary and in accordance with the testing instructions, the tester prompted to help the child provide a more complete story. The SPAC assesses articulation rather than memory, so the tester was able to remind the child of specific names and phrases that contained targeted sounds. The story

was told by the examiner and retold by the child twice to increase the number of productions for the goal phoneme. The children produced an average of 19 words containing the goal phoneme during the story task. The number of correct productions was divided by the total number of productions of the target phoneme to calculate a percent accuracy. A Pearson Correlation was conducted to determine the inter-judge reliability for both the SPAC word and story tests. Inter-judge reliability for the CPAC was 0.928 and the SPAC was 0.881.

Intervention

One speech-language pathologist employed by Carl Sandburg Elementary School provided both collaborative and traditional speech and language pull-out services to nine first and second grade classrooms. Three first grade and two second grade classes were assigned to collaborative conditions while the remaining four classrooms participated in the traditional model. Children with speech and language deficits were assigned to their classrooms at the beginning of the school year by the principal of the school without regard for the present study. Six of the nine classrooms were then randomly assigned. Two classrooms were assigned to the pull-out conditions due to other commitments of the teachers. Additionally, one classroom was assigned to the collaborative condition in order to make the number of children with communication individualized education plan (IEP) goals in each setting more equivalent. For a larger concurrent study, five classrooms of children participated in the collaborative service delivery model while four classrooms of children participated in the traditional service delivery model. Two of the five collaborative classrooms had no children with articulation disorders and therefore will not be discussed in this study. The number of children treated within the same

session was significantly different between the collaborative and pull-out groups. The mean number of children with IEP goals for the collaborative group was 5.67 per class in the three collaborative classrooms throughout the study ($\underline{M}$=4.67 at beginning of school year; $\underline{M}$=6.67 at end of school year). Children in the pull-out treatment model were treated in groups of one or two children.

Children in the study participated in collaborative classroom-based intervention or in traditional pull-out only. The collaborative classroom-based intervention was defined as the SLP and classroom teacher working together to target curricular and speech-language goals within the classroom setting. Traditional non-integrated intervention was defined as the two professionals working independently with the speech-language pathologist targeting speech-language goals in a pull-out setting and the classroom teacher targeting curricular goals within the classroom.

When choosing initial targets for children with multiple phoneme goals, the SLP considered the sequence of normal developmental sound acquisition in addition to client-specific factors such as sound relevance to the child, sound stimulability and visibility. The SLP implemented articulation therapy generally based on modifications of Van Riper's treatment methods. The SLP often used whole-part-whole practice procedures (Backus & Beasley, 1951) in which the goal phoneme was used in a natural communication situation, then part practice of the goal phoneme at the appropriate level (e.g., isolation word, phrase) occurred, and finally whole practice was resumed by continuing with the communicative interaction. The SLP provided visual, auditory, and tactile cues/prompts when treating goal sounds. Models and cues were faded as children demonstrated success with the phonemes. Specific and general feedback were also

provided. These methods were employed in both the pull-out and collaborative classroom-based settings utilizing children's literature.

Collaborative Classroom-Based Intervention

The speech-language pathologist, two Eastern Illinois University faculty members, and an EIU graduate student in Communication Disorders and Sciences (CDS) met at the commencement of the school year to discuss tentative activities and treatment methods. The SLP met with each classroom teacher individually prior to the beginning of the study to plan activities and organize materials. Regularly scheduled meetings throughout the semester allowed the SLP and each teacher to plan specific details of the classroom intervention and activities that would be implemented during the next week's collaborative language arts lesson.

The collaboration meetings were scheduled for 25 minutes every week for each of the three classroom teachers. A graduate student was included in the collaborative meetings. The graduate student completed a checklist that documented discussion and planning during the weekly collaborative meeting. Documented items included untargeted goals, absences, and other comments related to the previous collaborative lesson. Carryover ideas were suggested for the curricular and speech-language goals. The collaborative meeting also focused on choosing a story, identifying IEP objectives, and selecting narrative curricular goals (story grammar, literacy vocabulary, narrative comprehension strategies, similarities and differences, inferencing, stating details, and sequencing) which could be implemented in the subsequent collaborative lesson. The members then discussed activities to be used and roles for the preparation and implementation of the lesson. A collaborative planning form was developed at the

beginning of the school year based on suggestions by Prelock, Miller, and Reed (1993). This form was completed during each meeting to guide and document discussion.

Children who were in the classrooms that participated in the collaborative intervention received instruction from their respective classroom teacher as well as the speech-language pathologist using primarily a one-teach/one-drift model (SLP teach, teacher drift) but occasionally employing a team teaching collaborative approach. Instruction occurred during the language arts curricular lesson, which was provided for 30 minutes per week during the 2000-2001 school year. The following curricular goals relating to narrative comprehension skill development were targeted throughout the semester: story grammar, literacy vocabulary, narrative comprehension strategies, similarities and differences, inferencing, stating details, and sequencing.

Most collaborative lessons incorporated children's literature, which was generally read aloud to the class by the SLP. The SLP targeted speech-language objectives when introducing the story, during the story reading, and in activities following the story. Instruction related to narrative curricular goals was also included during these periods. Usually the teacher managed classroom behavior, assisted individual students, and participated in facilitation of whole class narrative goal instruction with activities such as story mapping and story re-enactment.

Each curricular lesson also targeted one or two speech sounds from the IEPs of children in that classroom. For the first three weeks and periodically throughout the first semester the SLP introduced the "sounds for the day" and a short 5-10 minute game entitled "Sounds Ahoy" was played. The game consisted of the teacher producing the sounds correctly and incorrectly while the SLP explained how the correct productions

were made. This activity allowed all children in the classroom to practice discriminating correctly and incorrectly produced phonemes. Then all children were given paper plates that were attached to a stick and contained the word "yes" on one side and "no" on the other. The children were required to determine whether example sounds produced by the SLP and teacher were correct (by displaying the "yes") or incorrect (by displaying the "no"). Each week when a child's target occurred in the story being read, the SLP stopped frequently to model the sound for the class and asked the class to practice the sound. The SLP frequently asked the children with speech IEPs what the target sound was or how it was made. The children received auditory feedback about their correct or incorrect productions as well as visual models or cues when needed. Pre-established visual cues between the child and SLP were used to signal that the child needed to think about his or her productions. These visual cues were subtle so that attention was not drawn to the student. Other cues involved auditory prompts to repeat the production or use the sound in another context, such as a sentence or phrase.

In addition to the 30-minute in-class curriculum lesson, all children received 10 minutes of individual treatment, which was conducted in the classroom while the regular classroom teacher resumed the primary teaching duties. The 10-minute drift period occurred across curricular areas including science, math, reading, snack, etc. No child received more than 40 minutes of treatment time each week in either of the conditions. The SLP worked one-on-one with each child to target IEP goals using materials from the collaborative lesson or the lesson currently being taught by the teacher. This time allowed for more one-to-one contacts between the SLP and the children with speech goals. Discussions during the individual time included talking about important words in

the story and demonstrations on how to produce the target sound(s). The SLP was able to provide more individualized feedback and the children gained additional practice on target sounds. The 10-minute intervention time also allowed the SLP to probe the child's productions and evaluate progress.

Traditional Pull-Out and Control Condition

Intervention was provided in 20-minute therapy sessions per week individually or in small groups in a traditional pull-out model of therapy in a separate room away from the classroom environment. Groups ranged from 1 to 2 students with a mean of 1.60 students at the beginning of the year and a mean of 1.89 students at the end of the year.

The therapy targeted speech goals using similar curricular materials as used in the collaborative lessons. More auditory and visual feedback were provided than in the classroom setting (Benefiel et al., 2001) and the children received a greater number of opportunities to practice productions of error sounds than in the collaborative setting (Benefiel et al., 2001). In the traditional pull-out setting, the SLP did not participate in classroom activities. However, she informally communicated with teachers about the children in their classrooms who had speech-language deficits.

CHAPTER IV

Results

Results of this study were determined by comparing the mean gain in percent accuracy between pretest and posttest scores obtained for both the collaborative classroom-based and pull-out groups on the Goldman-Fristoe Test of Articulation (Goldman & Fristoe, 1986) and Secord Contextual Articulation Tests (S-CAT; Secord & Shine, 1997). Group means and test gains were calculated for all 20 children receiving speech services in both the collaborative classroom-based and pull-out treatment conditions for each speech test administered. The unit of analysis presented is the mean gain per child; therefore the total sample size was the 9 children in the collaborative group and the 11 children in the pull-out group. Results regarding individual and group results on all tests of articulation are displayed in Appendix C.

Table 3 displays data comparing the group mean percentile rank scores and test gains and Table 4 displays mean number of errors and test gains on the Sounds-in-Words Subtest portion of the Goldman-Fristoe Test of Articulation (1986) for both the collaborative classroom-based and pull-out groups. Results of the Goldman-Fristoe Test of Articulation pretests revealed that the collaborative classroom-based group obtained lower percentile rank scores ($M = 16.67$) than the pull-out group ($M = 23.64$), but there was not a significant difference, $F(1, 18) = .845$, $p = .370$. However, the collaborative group had slightly higher mean percentile ranks ($M = 56.56$) than the pull-out group ($M = 53.09$) on posttests in the same area. However, a one-way analysis of variance (ANOVA) indicated no significant difference, $F(1, 18) = .047$, $p = .831$. Analysis of mean percent gain between the treatment groups revealed that the collaborative group

experienced a slightly greater mean gain (M = 39.89) than the pull-out group (M = 29.45), however, the difference between the groups was not significant, F (1, 18) = .708, p= .411.

Table 3. Group Mean Percentile Rank Scores and Standard Deviations for Subjects on the Goldman- Fristoe Test of Articulation Sounds-in-Words Subtest.

Group	Pretest	Posttest	Percent Gain
Collaborative			
M	16.67	56.56	39.89
(SD)	(15.25)	(37.30)	(30.75)
Pull-Out			
M	23.64	53.09	29.45
(SD)	(18.06)	(34.25)	(24.78)
p-value	(p=.370)	(p=.831)	(p=.411)

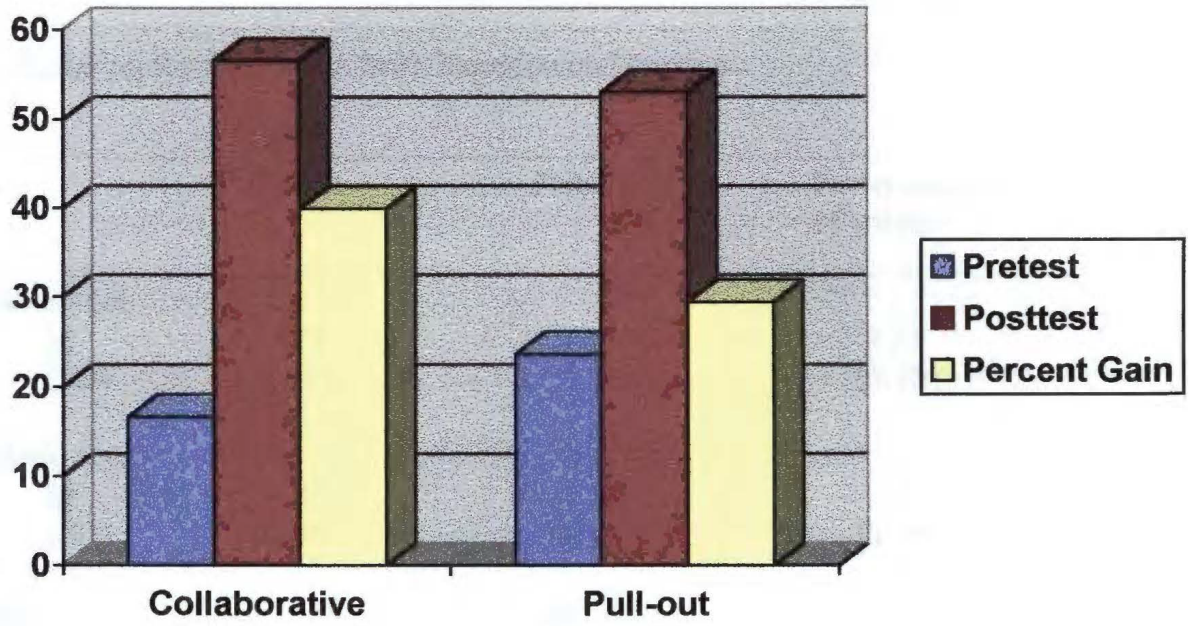

Figure 1. Comparison of mean percentile rank scores and test gains on the Goldman-Fristoe Test of Articulation for both treatment groups.

The number of errors on the Goldman-Fristoe Test of Articulation was compared between the collaborative classroom-based and pull-out groups for both pre- and posttests. The pretest scores for the collaborative (M = 13.78) and pull-out groups (M = 10.36) were similar, F (1,18) = .941, p= .345. The collaborative (M = 4.44) and pull-out (M = 5.36) groups' scores were also similar on posttest results, F (1,18) = .132, p= .721. However, the collaborative group made a slightly greater mean gain (fewer number of errors on the Goldman-Fristoe Test of Articulation at the end of school year than at the beginning of the school year; M=9.33) than the traditional pull-out group (M=5.00), F (1,18) = 4.864, p= .041.

Table 4. Mean Number of Errors and Standard Deviations on the Goldman-Fristoe Test of Articulation for Subjects in Both Experimental Groups.

Group	Pretest	Posttest	Fewer number of errors
Collaborative			
M	13.78	4.44	9.33
(SD)	(9.05)	(4.64)	(5.10)
Pull-Out			
M	10.36	5.36	5.00
(SD)	(6.70)	(6.31)	(3.69)
p-value	(p=.345)	(p=.721)	(p=.041)

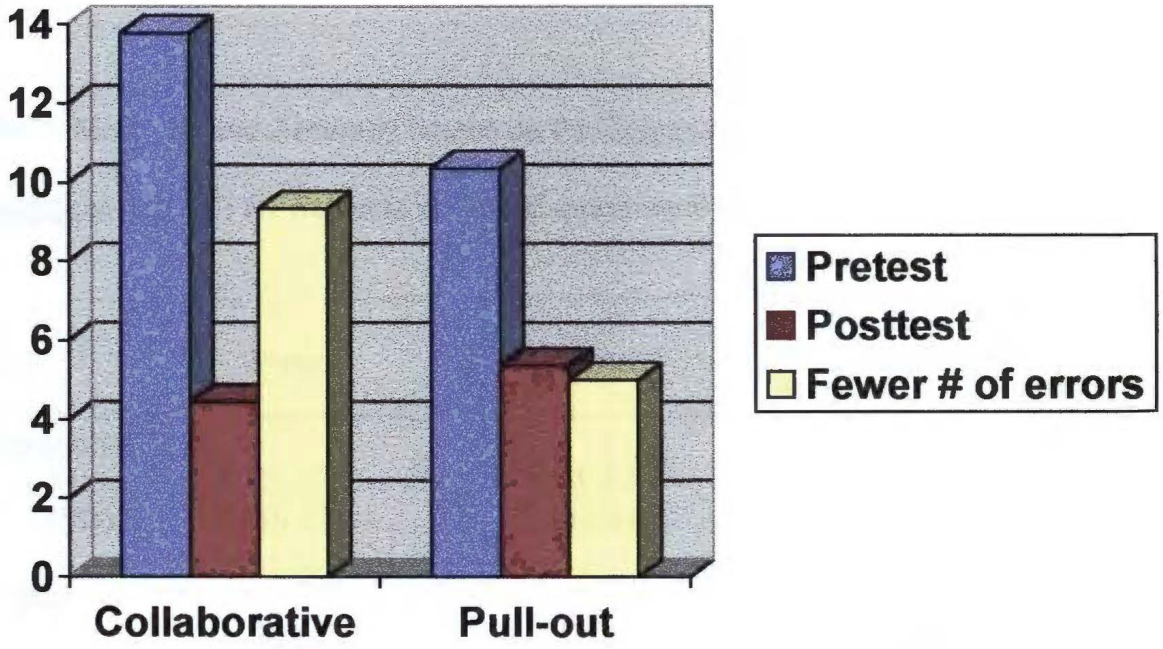

Figure 2. Comparison of mean number of errors on the Goldman-Fristoe Test of Articulation for both treatment groups.

Pre- and posttest data were analyzed for both experimental groups to determine which condition facilitated greater mean gain on the Contextual Probes of Articulation Competence (CPAC; Secord & Shine, 1997) word sections. The collaborative group (M = 25.85) scored similar to the pull-out group (M = 28.02) on initial evaluations. A one-way ANOVA indicated the two groups were not significantly different, F (1, 18) = .056, p= .816. However, analysis of final evaluations in April revealed that the collaborative group (M = 80.82) scored significantly higher than the pull-out group (M = 59.05), F (1, 18) = 3.49, p= .078. The collaborative group also experienced greater mean test gain (M = 54.97) than the pull-out group (M = 31.84). A one-way ANOVA revealed that the collaborative group's mean gain was significantly greater than the pull-out group's mean gain, F (1, 18) = 7.537, p= .013 (see Table 5 and Figure 3 for CPAC data).

Table 5. Mean Percent Accuracy Scores on the Contextual Probes of Articulation Competence (CPAC) for Subjects in Both Experimental Groups.

Group	Pretest	Posttest	Test Gain
Collaborative			
M	25.85	80.82	54.97
(SD)	(18.41)	(13.42)	(18.86)
Pull-Out			
M	28.02	59.05	31.84
(SD)	(21.88)	(32.67)	(18.65)
p-value	(p=.816)	(p=.078)	(p=.013)

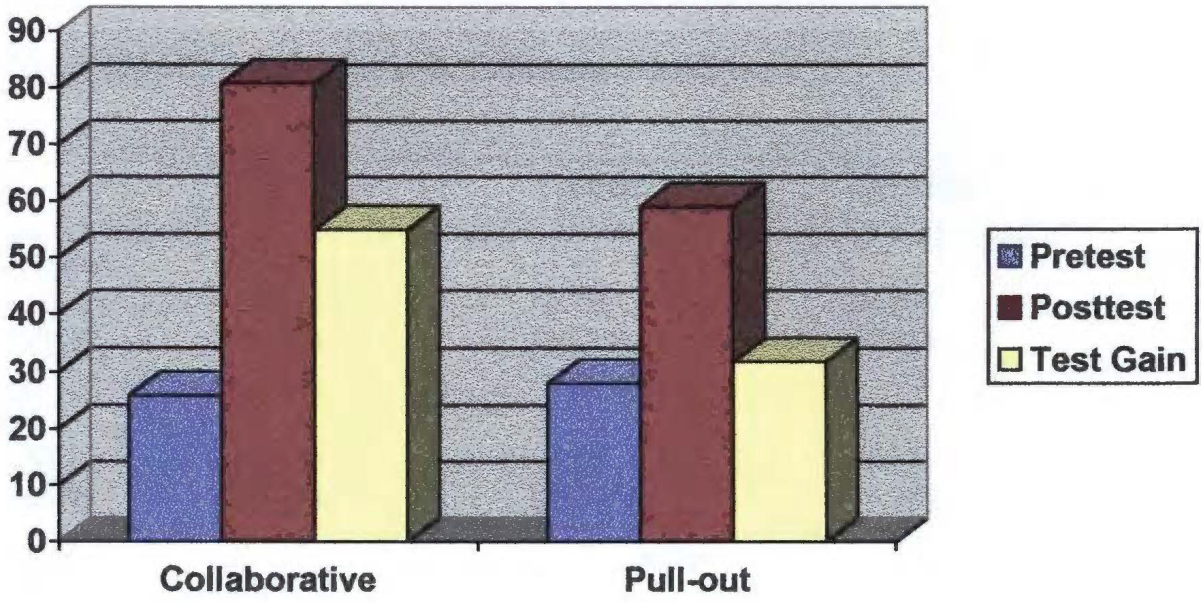

Figure 3. Comparison of mean percent scores on the Contextual Probes of Articulation Competence (CPAC) for children in both treatment groups.

The last evaluation instrument used to compare the two groups' articulation performance preceding and following intervention was the Storytelling Probes of Articulation Competence (SPAC). The children in each group re-told short stories and the percentage of target goal consonants articulated correctly was calculated. Pretest results revealed that both the collaborative classroom-based (M= 13.87) and pull-out (M = 16.79) groups were similar initially, F (1, 18) = .241, p= .649. The collaborative group scored slightly higher than the pull-out group on posttests of the SPAC (M = 72.21, M = 49.86, respectively). However, the scores were not significantly different as determined by a one-way ANOVA, F (1, 18) = 2.818, p= .111. Comparison of mean test gains for the two groups resulted in the collaborative group (M = 58.30) having a significantly higher mean gain than the pull-out group (M = 33.07), F (1, 18) = 6.741, p= .018 (see Table 6 and Figure 4 for SPAC data).

Table 6. Mean Percent Accuracy Scores on the Storytelling Probes of Articulation Competence (SPAC) for Subjects in Both Experimental Groups.

Group	Pretest	Posttest	Test Gain
Collaborative			
M	13.87	72.21	58.30
(SD)	(13.41)	(20.23)	(17.41)
Pull-Out			
M	16.79	49.86	33.07
(SD)	(14.48)	(35.40)	(24.48)
(p-value)	(p=.649)	(p=.111)	(p=.018)

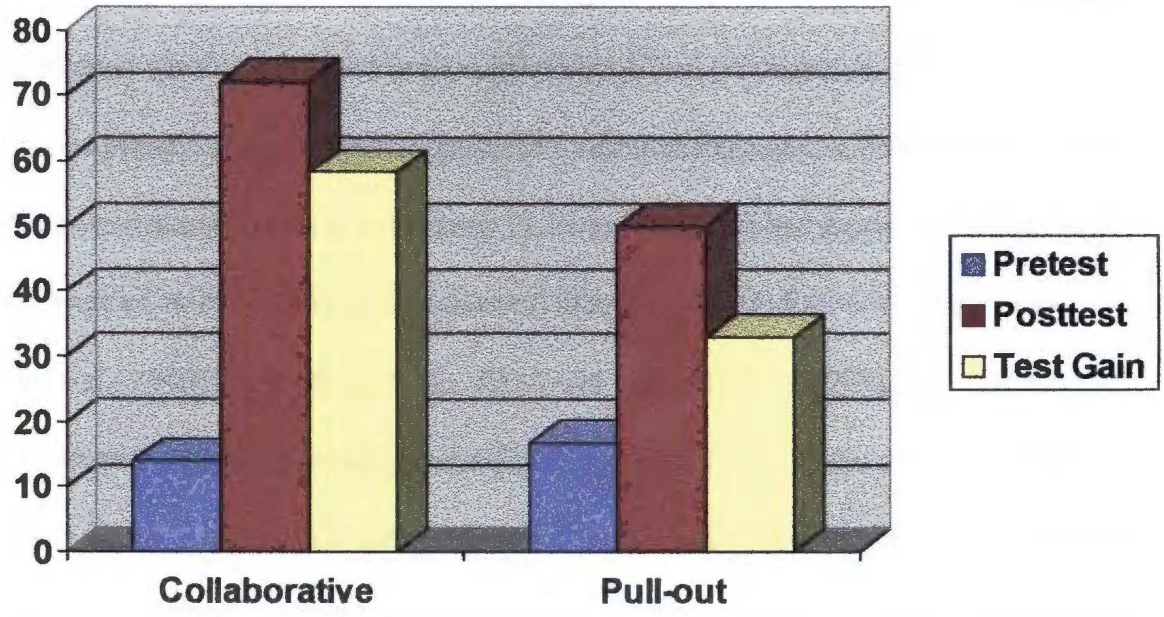

Figure 4. Comparison of mean percent scores on the Storytelling Probes of Articulation Competence (SPAC) for children in both treatment groups.

CHAPTER V

Discussion

The purpose of the present study was to compare the effectiveness of collaborative classroom-based services with traditional pull-out therapy on improvement of articulation skills for children in first and second grades.

Results of the present investigation suggested that collaborative service delivery by an SLP and classroom teacher yielded greater improvement of articulation skills for children in first and second grades than a solitary SLP teaching in a pull-out setting. The above statement was supported by the fact that in the present study, nine first and second grade children participating in a collaborative classroom-based service delivery model experienced significantly greater gains on IEP goal sounds than eleven first and second grade children who were treated in a traditional pull-out treatment model.

The present study supported past literature that suggested a collaborative and/or consultative treatment approach between SLPs and teachers had a positive effect on the achievement of children in their classroom (Ellis et al., 1995; Farber & Klein, 1999; Hadley et al., 2000; Throneburg et al., 2000; and Wilcox et al., 1991), but contradicted findings from studies that investigated effects of pull-out intervention to collaborative classroom-based treatment models on preschool children's language skills and found the two intervention conditions to be the same (Valdez & Montgomery, 1997; Wilcox et al., 1991). The results of the present study were counterintuitive to the Benefiel, Throneburg, et al. (2001) research, which described the number of times children in a collaborative classroom-based setting practiced their IEP goal sounds as compared to children in a pull-out setting. The study found that children with articulation disorders received half as

much practice of articulation goals during collaborative classroom-based lessons than children who received an equal amount of intervention time in a pull-out setting. The present study indicated that children with articulation goals participating in a collaborative classroom-based setting made significantly greater gains than children with articulation goals participating in a pull-out setting, despite the fact that the children received half as much practice in the collaborative intervention model. These results may have been influenced by several factors, including peer and teacher assistance with articulation goals in the collaborative setting when the SLP was not providing intervention in the classroom. Past research has reported positive effects of incorporating peers or teachers in articulation intervention. Johnston and Johnston (1972) conducted a study where two children served as discriminative stimuli for each other during activity and play periods. The two children were instructed to point out each other's misarticulated sounds. When paired together, the two children's correct articulation of specific error sounds increased and there were low rates of incorrect articulations. However, when each of the two children were paired with two other classmates without articulation problems who were not pointing out incorrectly articulated sounds, the two experimental children's rate of incorrectly articulated sounds increased. Another study by Marquardt (1959) suggested that children imitate peers producing correct speech sounds more easily than they imitate a teacher's model.

During interviews at the completion of the present study, teachers in the collaborative classrooms reported observing peers supplying explicit models and reminders of correct articulation for children with speech errors. Teachers providing instruction in traditional classrooms reported never observing students providing models

or reminders about error sounds to their peers with articulation errors. Teachers in the collaborative classrooms indicated that they were more aware of their students' communication goals and reported targeting articulation goals in their classrooms throughout the week, while teachers in the pull-out setting confirmed that they rarely or never addressed articulation goals in their classrooms.

During observation periods in the collaborative classrooms, the investigators also observed children frequently providing models and feedback to their peers regarding IEP articulation goals. Peers provided natural models during classroom activities, evaluated their own speech skills, and gave feedback to children with articulation deficits in a helpful fashion. Children with communication disorders in the collaborative classrooms did not appear to be disturbed by the attention that was drawn to their speech disorder by the SLP and their peers. Generally, all children in the classrooms reacted positively to the heightened awareness about how to correctly produce speech sounds. Peers were noted to request similar attention regarding their speech and one student even made a self-referral for his own error production. Despite the fact that peers' influence on first and second grade children in the present study appeared to be positive, older children may not react to the added attention in the same way. The pull-out treatment model may be more appropriate for older children who feel stigmatized by therapy in the presence of classmates.

The collaborative group's increased progress on articulation skills may be a result of better generalization skills than the pull-out group. An unfamiliar graduate student and SLP from the university conducted testing in an isolated room that was not used by the school SLP to provide services to any child in either intervention model. The children's

articulation skills were only assessed in this separate room and no modeling or feedback about correctness was provided. Therefore, the increased performance on posttests was more likely a result of generalization of articulation skills rather than conditioned responses within that certain environment or with a certain person. Results of the study were shared with the SLP who provided intervention when the project was completed. She commented that several of the children with speech IEP goals produced their goal sounds correctly when they were in the speech room. This could have been due to the fact that children were accustomed to having their speech corrected by the SLP every time they were in that particular room. This observation is consistent with frequently cited concerns of generalizing learned behaviors from pull-out intervention to other people and settings.

Theoretically, phonemes that require the most intensive instruction and practice for progress are nonstimulable sounds. Investigation of the gains made on sounds that were initially considered nonstimulable revealed that the two treatment groups experienced similar trends. Three of the five pull-out group's nonstimulable sounds made minimal progress (1%-3% accuracy gain in words), while two of the five sounds made good gains (59%, 74% accuracy gain in words). One of the four nonstimulable sounds displayed by children in the collaborative group made minimal progress (9% accuracy gain in words), while three of the four sounds made moderate gains (27%-44%).

Strengths

The present study was the first to compare effects of collaborative classroom-based intervention to pull-out therapy on articulation skills. Only one other non-published study investigated a collaborative service delivery model compared to

traditional pull-out therapy for children with IEP goals (speech and language). However, this study was very small in scope and had several limitations. Another strength of this study was that it compared collaborative classroom-based therapy to a traditional pull-out model of therapy for improvement of children's articulation abilities, with the children participating in the classroom model not receiving any additional pull-out intervention for their speech-language objectives.

Limitations

One limitation of the present study was that only six of nine classrooms were randomly assigned to treatment groups. Additionally, children with articulation deficits were in only three collaborative classrooms. Children with communication disorders were not evenly distributed among classes. Two of the classrooms in the pull-out group were not randomly assigned because of other commitments of the teachers. One class was not originally included in the random assignment for the study because one teacher taught the class in the morning while a different teacher taught the class in the afternoon. However when the number of children with communication deficits was counted for the pull-out and collaborative groups, this class was included in the collaborative group to create more similarity in the number of subjects in each group.

Another weakness of the current study was the fact that only one SLP participated in this study, providing services to all 20 children. She had been practicing as an SLP for 20 years. She also received training in providing collaborative/inclusive services and had practiced these skills in various classrooms for more than 5 years.

Practical Implications

One implication of the present study was that the collaborative classroom-based model of service delivery may be more beneficial than the traditional pull-out method. Another implication was that in order for a collaborative intervention approach to work, all partners involved in the process had to be willing to put forth the effort and time to plan and implement appropriate activities. When considering the current study, if the SLP could have selected the teachers with whom she wanted to collaborate, she may not have chosen three of the five teachers in the collaborative group. The reason was that two teachers had limited teaching experience, one teacher had a very structured teaching style, and one teacher only taught her classroom in the morning while a different teacher taught in the afternoon. Two of the teachers in the pull-out condition had provided collaborative services in the past with the SLP and would have preferred participating in the collaborative service delivery model. Good inclusive practices (Vaughn & Schumm, 1995) involve teachers who choose to participate rather than being mandated to participate, as is the case, by random group assignment.

Future Research

Additional research within the realm of collaborative classroom-based services is needed to replicate the findings of this study. The present study was conducted with only 20 first and second grade children with functional articulation deficits in one school in central Illinois. Future research should include a greater number of children of different ages from a variety of geographic regions. Future research should also investigate the effects of a collaborative classroom-based service delivery model for children with organic speech difficulties. Only one SLP, who had 20 years of experience with treating

children with speech-language disorders, participated in the present study, providing intervention to all 20 children. Future research should investigate the effects that a collaborative classroom-based model has on children with speech-language disorders when implemented by different speech-language pathologists. If the results of the present study can be confirmed through replication, there will be implications for the most appropriate service delivery model for children with articulation disorders in the school setting.

Appendix A

Participation Authorization Form

9-14-00

Dear Parents,

Mrs. Pam Paul, a speech-language pathologist at your child's school, and your child's teacher are working with two professors from Eastern Illinois University (Rebecca Throneburg and Lynn Calvert) to assess the effectiveness of speech-language services provided in the classroom and in the speech room. There are many reported advantages to each type of service. The purpose of our project is to determine if one is more effective.

Please sign the form below and check whether or not you give permission for your child to participate in the evaluation of speech-language skills at the beginning and end of the school year to evaluate the effectiveness of these lessons.

Graduate students from Eastern Illinois University will assist with the evaluations. The evaluation will include listening to a story, retelling the story, and other brief activities related to your child's speech or language needs. Pam may share information from your child's IEP with the faculty from Eastern. Results and information obtained will be confidential. If you would like information about your child's progress we would be happy to share this with you. Eastern Illinois University faculty may use summary information for groups of children (no individual children will be identified or discussed) for teaching or publications. Please return this letter to your child's teacher by Friday.

Sincerely,

Pam Paul, Speech-Language Pathologist

Lynn Calvert, Associate Professor

Rebecca Throneburg, Assistant Professor

Please check one of the following and return to your child's teacher or the front office.

I give permission for my child to participate in the evaluation and for Eastern faculty to have knowledge of information from my child's IEP.

I do not give permission for my child to participate in the evaluation or for Eastern faculty to have knowledge of information from my child's IEP.

_____
(parent signature)

_____ Teacher/Class_____
(child's name)

(date)

Appendix B

Individual Subject Characteristics

	Age (years)	Other Dx or Services	Grade	Past Therapy (years)	Goldman-Fristoe Percentile Rank	Goldman-Fristoe Number of Errors	Number of IEP Goals	Stimulable
Pull-out								
Child 1	7:0	None	1	1	14	13	4	All but /r/
Child 2	6:8	None	1	4	6	17	5	For all
Child 3	7:7	Language Tx	1	2	40	3	1	For all
Child 4	7:11	None	2	2	11	9	2	For all
Child 5	6:2	Reading Recovery	1	1	25	8	1	All but /r/
Child 6	7:6	None	2	2	63	2	1	For all
Child 7	7:5	Language Tx, Title Reading, Slow learner	2	2	23	6	1	For all
Child 8	8:5	Language Tx, Counseling	1	2	8	17	4	All but /r/
Child 9	6:6	None	1	1	36	7	1	For all
Child 10	6:10	None	1	3	31	8	3	For all
Child 11	7:7	Behavior Disorder	2	2	3	24	6	All but /ch, sh/
Group Mean	**7:3**			**2.00**	**23.64**	**10.36**	**2.64**	
(SD)	0:8			0.89	18.06	6.70	1.86	
Collaborative								
Child 12	8:1	Language Tx, Learning Disability	2	5	7	14	5	For all
Child 13	6:7	Language Tx, Learning Disability,	1	4	2	31	7	All but /r/

		Reading Recovery						
Child 14	6:1	None	1	2	10	15	3	All but /r/
Child 15	8:5	ADD, Learning Disability	2	3	19	8	2	For all
Child 16	7:11	Language Tx, Learning Disability, Counseling, ADD	2	3	22	8	3	For all
Child 17	6:9	None	2	3	51	4	1	For all
Child 18	7:6	None	2	2	20	9	2	All but /r/
Child 19	7:8	None	2	1	0	26	5	All but /r/
Child 20	7:11	None	2	3	19	9	1	For all
Group Mean	**7:5**			**2.89**	**16.67**	**13.78**	**3.33**	
(SD)	0:9			1.17	15.25	9.05	2.06	

Appendix C

Individual and Group Results

	Sound	Stimulable	S-CAT Word Pretest	S-CAT Word Posttest	S-CAT Word Gain	S-CAT Story Pretest	S-CAT Story Posttest	S-CAT Story Gain
PULL-OUT								
Child 1	S	Y	4%	69%	65%	0%	18%	18%
	Z	Y	0%	83%	83%	0%	50%	50%
	Th (uv)	Y	69%	88%	19%	75%	100%	25%
	R	N	15%	89%	74%	0%	82%	82%
Child 1 Mean			**22%**	**82.25%**	**60.25%**	**18.75%**	**62.50%**	**43.75%**
Child 2	Th (uv)	Y	6%	91%	85%	30%	91%	61%
	L	Y	47%	96%	49%	50%	100%	50%
	R	Y	11%	73%	62%	50%	64%	14%
	Z	Y	7%	60%	53%	0%	60%	60%
	S	Y	4%	20%	16%	0%	10%	10%
Child 2 Mean			**15%**	**68%**	**53%**	**26%**	**65%**	**39%**
Child 4	S	Y	1%	4%	3%	0%	0%	0%
	Z	Y	0%	80%	80%	0%	24%	24%
Child 4 Mean			**.5%**	**42%**	**41.5%**	**0%**	**12%**	**12%**
Child 9	S	Y	56%	95%	39%	18%	44%	26%
Child 9 Mean			**56%**	**95%**	**39%**	**18%**	**44%**	**26%**
Child 10	R	Y	7%	53%	46%	0%	35%	35%
	L	Y	67%	96%	29%	75%	100%	25%
	Th (v)	Y	56%	98%	42%	55%	93%	38%
Child 10 Mean			**43.33%**	**82.33%**	**39%**	**43.33%**	**76%**	**32.67%**
Child 8	Z	Y	56%	95%	39%	55%	94%	39%
	S	Y	69%	98%	29%	6%	100%	94%
	R	N	5%	64%	59%	0%	60%	60%
	Th (uv)	Y	69%	88%	19%	44%	95%	51%
Child 8 Mean			**49.75%**	**86.25%**	**36.5%**	**26.25%**	**87.25%**	**61%**

Child 7	R	Y	22%	56%	34%	11%	77%	66%
Child 7 Mean			**22%**	**56%**	**34%**	**11%**	**77%**	**66%**
Child 3	Th (uv)	Y	66%	94%	28%	33%	100%	67%
Child 3 Mean			**66%**	**94%**	**28%**	**33%**	**100%**	**67%**
Child 5	R	N	9%	11%	2%	0%	0%	0%
Child 5 Mean			**9%**	**11%**	**11%**	**0%**	**0%**	**0%**
Child 11	L	Y	72%	95%	23%	50%	100%	50%
	Dz	Y	2%	0%	-2%	0%	0%	0%
	S	Y	2%	0%	-2%	0%	0%	0%
	Z	Y	0%	7%	7%	0%	0%	0%
	Sh	N	0%	1%	1%	0%	0%	0%
	Ch	N	0%	3%	3%	0%	0%	0%
Child 11 Mean			**12.67%**	**17.67%**	**5%**	**8.33%**	**16.67%**	**8.34%**
Child 6	R	Y	12%	15%	3%	0%	8%	8%
Child 6 Mean			**12%**	**15%**	**3%**	**0%**	**8%**	**8%**
Group Mean			**28.02**	**59.05**	**31.84**	**16.79**	**49.86**	**33.07**
(SD)			21.88	32.67	18.65	14.48	35.40	24.48
Collaborative								
Child 20	R	Y	9%	87%	78%	0%	50%	50%
Child 20 Mean			**9%**	**87%**	**78%**	**0%**	**50%**	**50%**
Child 19	R	N	0%	27%	27%	0%	0%	0%
	Th (uv)	Y	0%	91%	91%	0%	100%	100%
	Z	Y	3%	87%	84%	0%	0%	0%
	S	Y	13%	100%	87%	0%	100%	100%
	L	Y	6%	100%	94%	0%	94%	94%
Child 19 Mean			**4.4%**	**81%**	**76.6%**	**0%**	**58.8%**	**58.5%**

Child 16	S	Y	8%	100%	92%	0%	100%	100%
	Z	Y	59%	99%	40%	50%	100%	50%
	Th (uv)	Y	6%	88%	82%	0%	85%	85%
	R	Y	8%	100%	92%	0%	100%	100%
Child 16 Mean			**24.33%**	**95.67%**	**71.34%**	**16.67%**	**95%**	**78.33%**
Child 14	Z	Y	1%	80%	79%	0%	89%	89%
	R	N	0%	44%	44%	0%	24%	24%
	S	Y	4%	79%	75%	0%	76%	76%
Child 14 Mean			**1.67%**	**67.67%**	**66%**	**0%**	**63%**	**63%**
Child 15	S	Y	34%	100%	66%	0%	97%	97%
	Z	Y	47%	91%	44%	82%	100%	18%
Child 15 Mean			**40.5%**	**95.5%**	**55%**	**41%**	**98.5%**	**57.5%**
Child 13	Th (uv)	Y	3%	72%	69%	8%	36%	28%
	Dz	Y	8%	95%	87%	6%	80%	74%
	R	N	0%	9%	9%	0%	0%	0%
	Ch	Y	10%	76%	66%	0%	67%	67%
	L	Y	55%	80%	25%	67%	70%	3%
	Sh	Y	27%	87%	60%	0%	71%	71%
	S	Y	88%	96%	8%	26%	96%	70%
Child 13 Mean			**27.29%**	**73.57%**	**46.28%**	**15.29%**	**60%**	**44.71%**
Child 17	S	Y	58%	96%	38%	10%	100%	90%
Child 17 Mean			**58%**	**96%**	**38%**	**10%**	**100%**	**90%**
Child 18	L	Y	69%	96%	27%	43%	100%	57%
	R	N	2%	44%	42%	0%	44%	44%
Child 18 Mean			**35.5%**	**70%**	**34.5%**	**21.5%**	**72%**	**50.5%**
Child 12	Th (v)	Y	63%	84%	21%	56%	83%	27%
	K	Y	51%	94%	43%	29%	80%	51%
	G	Y	45%	94%	49%	17%	100%	83%
	V	Y	0%	8%	8%	0%	0%	0%
	F	Y	1%	25%	24%	0%	0%	0%

Child 12 Mean			**32%**	**61%**	**29%**	**20.4%**	**52.6%**	**32.2%**
Group Mean			**25.85**	**80.82**	**54.97**	**13.87**	**72.21**	**58.30**
(SD)			18.41	13.42	18.86	13.41	20.23	17.41

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